2.4 Deductive Reasoning

Biconditional Statement--conjuction of a conditional and its converse

iff if and only if

Example:
If a quadrilateral has 4 right angles, then it is a rectangle.
If a quadrilateral is a rectangle, then it has 4 right angles

A quadrilateral has 4 right angles iff it is a rectangle.

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Deductive Reasoning--use facts, rules, definitions, or properties to reach logical conclusions

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Example:
If 2 angles are vertical, then they are congruent.

a. Given: ∠1 and ∠2 are vertical

Conclusion: ∠1 ≅ ∠2 valid

b. Given: ∠1 ≅ ∠2

Conclusion: invalid

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If the given matches the hypothesis, then you can make a valid conclusion.

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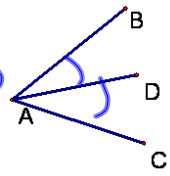
Example:
If a ray bisects an angle, then it divides it into 2 ≅ ∠s.

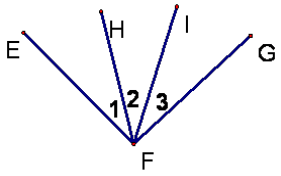
a. Given: $\overrightarrow{AD}$ bisects ∠BAC

Conclusion: ∠DAC ≅ ∠BAD



b. Given: ∠1 ≅ ∠3

Conclusion: N/A



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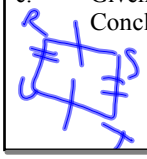
Example:
If a figure is a rectangle, then opposite sides are congruent.

a. Given: ABCD is a rectangle
Conclusion: $\overline{AB} \cong \overline{CD}$; $\overline{AD} \cong \overline{BC}$

b. Given: MNOP is a valid trapezoid
Conclusion: No concl.

c. Given: Figure RSTU; RS = TU, ST = RU
Conclusion: No concl.



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Examples of Law of Detachment
Law of Detachment--If p→q is true, and p is true then q is true.

Translation: If p→q is true, and you are given p, then the conclusion is q.

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Different type of reasoning.

Example:
Given: $\overline{WX} \cong \overline{UV}$; $\overline{UV} \cong \overline{RT}$

Conclusion:

$\overline{WX} \cong \overline{RT}$

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Example:
(1) If Casey gets to bat, then he will get a hit.

(2) If Casey gets a hit, then we will win the game.

(3) If Casey gets to bat, then we will win the game.

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These are examples of the Law of Syllogism

If p→q, and q→r are true, then p→r is true.

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Use the Law of Syllogism to determine whether a valid conclusion can be reached from each set of statements. If a valid conclusion is possible, write it. If not, write *no conclusion*.

6. If you are 18 years old, you are in college.
   You are in college.
7. The midpoint divides a segment into two congruent segments.
   If two segments are congruent, then their measures are equal.

Determine whether statement (3) follows from statements (1) and (2) by the Law of Detachment or the Law of Syllogism. If it does, state which law was used. If it does not, write *invalid*.

8. (1) If Molly arrives at school at 7:30 A.M., she will get help in math.
   (2) If Molly gets help in math, then she will pass her math test.
   (3) If Molly arrives at school at 7:30 A.M., then she will pass her math test.
9. (1) Right angles are congruent.
   (2) $\angle X \cong \angle Y$
   (3) $\angle X$ and $\angle Y$ are right angles.

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INSURANCE **For Exercises 10 and 11, use the following information.**
An insurance company advertised the following monthly rates for life insurance.

If you are a:	Premium for $30,000 Coverage	Premium for $50,000 Coverage
Female, age 35	$14.35	$19.00
Male, age 35	$16.50	$21.63
Female, age 45	$21.63	$25.85
Male, age 45	$23.75	$28.90

10. If Ann is 35 years old and she wants to purchase $30,000 of insurance from this company, then what is her premium?
11. If Terry paid $21.63 for life insurance, can you conclude that Terry is 35? Explain.

Oct 5-7:19 AM

HW
p85-86 #s 12-29

p81 #1

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